

CHT 212
Exam III

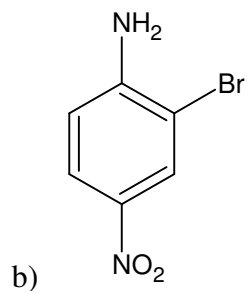
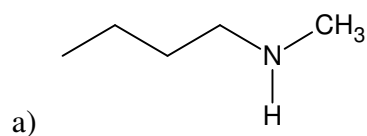
1. Draw the following compounds.

a) 2-benzyl-3-hydroxy-4-phenylbutanal

b) (2*E*, 5*S*)-5-methyl-2-heptene-4-one (the main flavor component of hazelnuts)

c) *N,N*-dimethyl-2,4-dichloroaniline

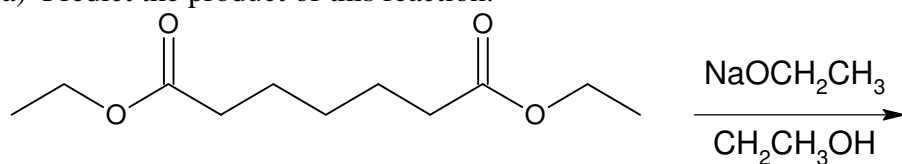
2. Provide unambiguous, systematic names for the following compounds.



c) $(\text{C}_6\text{H}_5)_3\text{P}$

3. The diester diethyl heptanedioate, shown below, reacts with sodium ethoxide and ethanol in an intramolecular reaction to form a cyclic compound.

a) Predict the product of this reaction.



b) What is the name of this reaction?

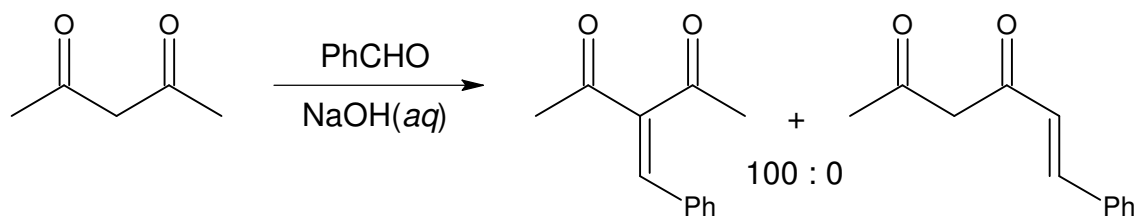
c) Propose a mechanism for this reaction.

d) Diethyl hexanedioate will undergo a similar reaction, but diethyl butanedioate and diethyl propanedioate do not. Why?

4. Rank the compounds ammonia, methylamine, nitramine (O_2NNH_2), and aniline in terms of increasing basicity. Explain your answer.

5. One synthesis of methamphetamine, one of the more notorious illegal drugs in Indiana, can be synthesized by reductive amination of phenylacetone with methylamine. Draw the structure of methamphetamine and the imine intermediate in the reductive amination.

6. 2,4-pentanedione can form two different enolates. However, 2,4-pentanedione reacts with benzaldehyde in aqueous base to form only one product:



a) Propose a mechanism for this reaction.

b) What is the name of this reaction?

c) Explain why the enolate is formed on carbon 3 of 2,4-pentanedione and not carbon 1.

7. Propose a synthesis for each of the following molecules, starting from benzene, toluene, alcohols of four carbons or fewer, and any necessary inorganic reagents.

a) *m*-dibromobenzene

b) 2,2-dimethyl-1,3-pentanediol